As a verification of this theory, I beg leave to project on the screen a series of colour photographs, representing natural objects: pictures on stained glass, landscapes from nature, flowers, and a portrait from life. Every colour in nature, including white, and the delicate hue of the human complexion, is thus shown to be reflected by a correctly developed photographic film.

It is to be remarked that, as in the case of the spectrum, the colours are visible only in the direction of specular reflection. If I had tried to touch up these photographs by means of water colours or other pigments, these would be made apparent by slightly turning the photograph; these pigments remaining visible under every incidence, they would thus be seen to stand out on a colourless background. Thus the touching up or falsifying by hand of a colour photograph is happily made impossible.

"Note on Photographing Sources of Light with Monochromatic Rays." By Captain W. DE W. ABNEY, C.B., D.C.L., F.R.S. Received March 31,—Read April 30, 1896.

In a paper "On the Production of Monochromatic Light," communicated to the Physical Society, and read on the 27th June, 1885, and which appears in the 'Philosophical Magazine' for August in that same year, I stated that by the apparatus then described a monochromatic image of the sun could be thrown upon the screen. In the same periodical for June of the same year, Lord Rayleigh described a plan for obtaining a monochromatic image of an external object, in which a concave lens was placed behind the slit of a spectroscope to produce an image of the object in monochromatic colour, the object being viewed through an aperture placed in the spectrum produced by the apparatus. I had been working independently at the subject at the same time, and my object was to get an image on a screen or photographic plate rather than to use the apparatus for visual observation. When a lens is placed behind the spectrum in the manner described in the paper above referred to, a white image of the prism can be obtained on a screen placed at some distance from the lens, and the size of the image can be increased or diminished according to the focal length of the lens, and its distance from the spectrum. Evidently, then, if an image of a luminous object can be cast on the surface of the prism, and a slit be placed in the spectrum, the image of the luminous object will be seen of the colour of the light passing through the slit. There are devices adopted at the present time for photographing the sun with light of various wave-lengths, but, as far as I am aware, they depend upon moving the image of the sun across the slit of the spectroscope, the

plate moving across the slit in the spectrum at the requisite rate for the various impressions made by the different parts of the sun's image to coalesce. It had struck me some time since that the method thus indicated nearly eleven years ago might be more convenient than that adopted, but the time I had at my disposal prevented my carrying out a continuation of my experiments. Recently I have had occasion to take up this subject for a rather different purpose, and as the method seems to have been untried, I give it in more detail than I did then.

My investigation called for a determination of the proportions of various rays emitted by the various parts of the carbon of the positive and negative poles of an electric arc light, and for this purpose the system of forming monochromatic images was found to be useful. The points of the electric light EL (fig. 1) were placed so that a beam

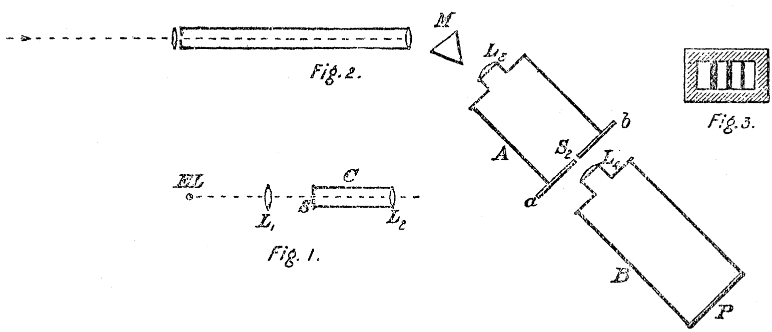

Fig. 2. Fig. 3. Fig. 1.

of light passed through the slit S of the collimator on to the centre of the collimating lens L_2. A convex lens L_1 of shorter focus than L_2 was placed in the path of the rays, and so adjusted that a real image of the poles was formed on L_2. These passed through the lens L_2 as nearly parallel rays and struck upon the prism, and then passed through the remainder of the apparatus as sketched in fig. 2, where M is the prism, L_3 a lens to bring the rays to a focus as a spectrum on *ab* after passing through a camera, A. L_4 is a lens, shown in the figure connected with a camera, B, which brings the image of the prism and the bright image cast on it to a focus at P. By placing a slit S_2 in the spectrum, the image cast on P will be as monochromatic as the light coming through the slit. L_1 should be of such a focal length that it should be as near the slit as possible. With this arrangement it is very curious to watch the variations in the brightness of the arc and of the flame which accompanies the movement of the slit through the spectrum, and as each variation can be photographed on a Cadett polychromatic photographic plate, we can obtain records of all that is

occurring. Further, by using strips of lenses cut out at suitable distances from the axes (fig. 3), images of various colours can be placed side by side upon P, since a slit may be placed in the spectrum opposite each such strip of lens. Incidentally, I may mention that investigations into the cause of the variable nature of different flames can be carried out by this plan.

For solar work, a long collimator appears to be a necessity, but the aperture need not be large. Suppose we determine to have an image of the sun on P (fig. 2) of 2 in. diameter, the image on M need not be more than 1 in. at most. For this purpose we must have a collimator 10 ft. long. Two lenses of this focal length can be fixed one at each end, and a slit in front of that lens which is presented to the sun's rays. The arrangements followed will be the same as those given for the electric light. There appears no difficulty in producing a monochromatic image of almost any size if the collimator be sufficiently long and the face of the prism sufficiently large to take in the whole of the image cast on it.*

I have replaced the prism by flat refraction gratings with most satisfactory results. The gratings I employed had about 6,000 and 12,000 lines to the inch. The images were sharply defined, but, of course, weaker than when the prism was employed. For solar work this should not be an objection, since there is plenty of light to work with.

I show some pictures taken by the plan I have described. For my purpose the images are sufficiently sharp, although simple uncorrected lenses have been employed.

"On the Determination of the Photometric Intensity of the Coronal Light during the Solar Eclipse of 16th April, 1893." By Captain W. DE W. ABNEY, C.B., D.C.L., F.R.S., and T. E. THORPE, LL.D., F.R.S. Received April 14,—Read April 30, 1896.

(Abstract.)

In this paper the authors give the results of the measurements of the intensity of the light of the corona, as observed at Fundium in Senegal, on the occasion of the solar eclipse of April 16th, 1893. The methods employed by them were practically identical with those used at Grenada, in the West Indies, during the eclipse of 1886, an account of which is given in the 'Phil. Trans.,' A, 1889,

* It should be mentioned that to minimise diffraction the slits should be used fairly wide. Hence a long collimator such as described and a good dispersion will be necessary to obtain the best definition of the sun's image.—*April* 30.